

THE GENUS *EUREMA* FROM PALAWAN ISLAND, PHILIPPINES  
(LEPIDOPTERA: PIERIDAE)

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This study is mainly based on the collection made by Mr. Yasuzo Honda during his stay in Palawan Island as a member of the Kawansei Gakuin University Academic Exploration Party to Palawan Island in 1967–1969.

The six *Eurema* species dealt with in this paper all belong to the *hecate* group. Both sexes of the butterflies and their male genitalia are figured, and some important characters of them are described in detail. Of six species, two, *simulatrix* and *andersoni*, are now recorded for the first time as occurring in the island, and one, *alitha*, which has hitherto been treated as a subspecies of *hecate* in Palawan, is recognised as a good species; three subspecies are described as new. *Eurema ada prabha* (Fruhstorfer) is not available for the present study, thought it is known to occur in the island.

In compiling this paper I tender my warmest thanks to Mr. Yasuzo Honda for submitting the material to me and for his information on the Palawan butterflies. I would like to express my heartfelt thanks to Dr. Takashi Shirôzu, Kyushu University, for his constant guidance and valuable advice. To Messrs. Renji Wada and Toyoho Nishida, I am indebted for the material from various parts of the Philippines. Finally I acknowledge my deepest thanks to Messrs. Yoshinobu Uemura and Syuji Tachikawa, Tokyo University of Agriculture, for taking photographs of the male genitalia.

**1. *Eurema hecate jalendra* (Fruhstorfer, 1910) (Figs. 21–24, 45)**

Wing contour. ♂♀: Both wings most similar to those of the following species, *E. alitha*, in terms of hindwing clearly angled between veins 3—4 and also between veins 6—7. Forewing length 18—24 mm.

Upperside. ♂: Ground colour yellow. Forewing with apex and termen bordered with black, the inner margin of which is abruptly excavated between veins 2 and 4, forming two angles at veins 2 and 4. Angle at vein 2 variable in shape, but angle at vein 4 usually forming a right or acute angle. Costa blackish yellow, with black scales. Hindwing with comparatively broad black border, the inner margin of which is slightly projected along each vein. In this subspecies the black border of the forewing is generally narrower than that of the Bornean and Southern Philippine forms.

♀: Both wings paler yellow with slight black dusting in basal area; black border much broader than in male; features of inner margin of black area as in male.

Underside. ♂♀: Ground colour yellow. Both wings with blackish brown spots variable, i.e., some individuals almost obsolete, and others very conspicuous, normally with two cell spots on forewing and without small spot at base of space 7 on hindwing.

Cilia of forewing with mixture of black and yellow, and of hindwing yellow.

Male genitalia: Saccus with length about  $0.7 \times$  height of ring. Valva with two curved finger-like appendages on costa+ampulla; usually sharply pointed, curved distal process and two curved finger-like appendages on harpe. Uncus rather short and broad, barely tapering towards tip, which clearly bifurcates and directs upward usually at angle of  $120^\circ$  to stem, or rarely at much sharper angle.

Specimens examined: 8♂, 3♀, Taot-Daram, Plaawan, 5. V. 1967–8. VIII. 1968 (Y. Honda); 19♂, Ransang, Palawan, 25. VII. 1968–26. XII. 1969. (Y. Honda); and many additional materials.

The type of ssp. *jalendra* from Palawan undoubtedly belongs to *hecate*, judging from the original description.

**2. *Eurema alitha hondai* ssp. nov. (Figs. 11–15, 25–28, 46)**

Wing contour. ♂♀: Both wings similar to those of *hecate*. Apex of forewing much rounder than in *hecate*. Forewing length 20–24 mm.

Upperside. ♂: Ground colour brighter yellow than in *hecabe*. Forewing having apex and termen bordered with black; inner margin of black area excavated between veins 2 and 4, forming two angles at viens 2 and 4. Angle at vein 2 usually right-angled, whereas angle at vein 4 always obtuse-angled, in the most cases with the angular measure of about 120°. Costa clearly margined with black, almost without mixture of yellow scales. Hindwing with black border broader than that of *hecabe jalendra*; inner margin of black border clearly defined and slightly projected along each vein.

♀: Both wings paler yellow usually with black dusting in basal area, sometimes more extensive, normally with indication of blackish cell-end bar, black border conspicuously broader than in male; features of inner margin of black area as in male.

Underside. ♂♀: Ground colour yellow. Both wings with blackish brown spots very variable in its intensity as in *hecabe*. Normally forewing with two cell spots, and hindwing without small spot at base of space 7.

Cilia of forewing with mixture of black and yellow, and of hindwing yellow.

Male genitalia: Saccus with length about  $0.7 \times$  height of ring. Valva with contour, appendages and distal process quite similar to those of *hecabe*. Uncus longer and much slender than that of *hecabe*, tapering towards tip, which clearly bifurcates and directs downwards.

Holotype ♂, Ransang, Palawan, 18. VII. 1968 (Y. Honda); paratype ♀, Ransang, Palawan, 18. VII. 1968 (Y. Honda). The type-series is preserved in the personal collection of Mr. Honda, Mino, Osaka Prefecture.

Additional material: 6♂, 1♀, Rangsag, Palawan, 18. VII. 1968—24. XI. 1969 (Y. Honda); 1♂, 3♀, Tagbros, Palawan 8. IV. 1967—13. XI. 1969. (Y. Honda); and others.

In this new subspecies (figs. 11–15) the black border of the upperside of both wings is markedly broader and darker than that of ssp. *esakii* from Formosa (figs. 16–20) in both sexes. The nominate subspecies *alitha* from Mindanao (Figs. 1–10) is quite different from this new subspecies; the latter always without basal black border continued to the termen on the upperside of the forewing.

As regards to the affinity of three taxa, *Euraema alitha alitha* Felder (Mindanao), *Eurema alitha hondai* ssp. nov. (Palawan) and *Eurema alitha esakii* Shirôzu (Formosa), the following facts are noted: (1) The former two (*alitha* and *hondai*) are quite identical in the male genitalia (fig. 46), in having similar uncus and valva as described above. In *esakii* the shape of the tip of uncus is slightly different from *alitha* and *hondai*, otherwise quite identical with the two. (2) *alitha* (Felder, 1862) was regarded as race of *E. tilaha* (Horsfield, 1829) by Corbet and Pendlebury (1932), but in spite of the similarity of the facies at a glance, the two have entirely different male genitalia from each other, and should not be regarded as conspecific. They are not closely allied species in the *hecabe* group. They have many different characters in facies as well as in male genitalia. (3) The black basal border along the dorsum of the forewing is not good specific character. The instance is shown in figs. 1–10.

### 3. *Eurema simulatrix princesae* ssp. nov. (Figs. 29–32, 47)

Wing contour. ♂♀: Forewing usual; hindwing termen evenly curved. Forewing length 21–25 mm.

Upperside. ♂: ground colour lemon yellow with slight greenish tinge. Forewing with usual black border, excavated more deeply in space 2 than in space 3. Angle at vein 4 rather various in shape. Costa clearly black. Hindwing with a comparatively broad border, the inner margin of which is waved in appearance.

♀: Both wings paler, with black border broader; otherwise no difference in sexes.

Underside. ♂♀: Pale lemon yellow with prominent blackish brown spots almost without individual variation. Two cell spots on forewing and cell-end spots on both wings very large and prominent. Hindwing with spot at base of space 7, and usually with two ring-like spots at base of space 1.

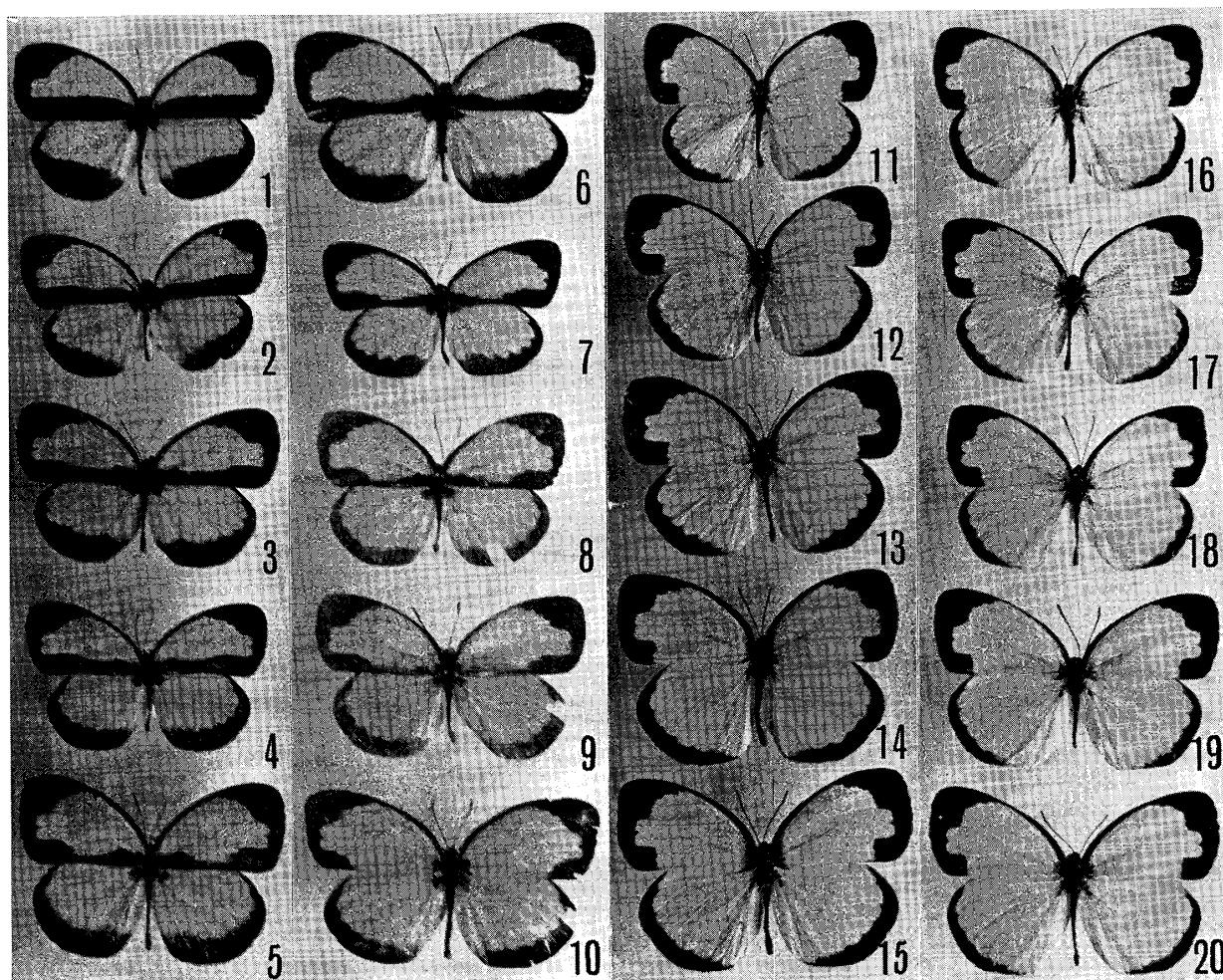
Cilia of forewing black, and of hindwing black and yellow.

Male genitalia: Saccus stout and shorter than that of the two preceding species, with length about  $0.6 \times$  height of ring. Valva without prominent finger-like appendage on costa+ampulla; distal process pointed and curved; two curved, finger-like appendages on harpe. Uncus much slender than that of *hecabe*, slightly broader than that of *alitha*, tapering towards tip, which clearly bifurcates and directs downward.

Holotype ♂, Taot-Daram, Palawan, 1. VIII. 1968 (Y. Honda); paratype ♀, Taot-Daram, Palawan, 30. VII. 1968 (Y. Honda). The two are in the personal collection of Mr. Honda, Mino, Osaka Prefecture.

Additional material: 38♂, Ransang, Palawan, 22. VII. 1968—27. XI. 1969 (Y. Honda); 2♂, 1♀, Taot-Daram, Palawan, 30. VII.—5. VIII. 1968 (Y. Honda); and others.

In this new subspecies the ground colour of upperside of wings is slightly paler than that of other races, and the underside of male forewing entirely lacks the large reddish brown apical spot, which is very prominent in



Figs. 1–20. *Eurema alitha* Felder: (1–10) *E. a. alitha* Felder, Zamboanga, Mindanao; (11–15) *E. a. hondai* ssp. nov., Palawan; (16–20) *E. a. esakii* Shirôzu, Formosa.

Malaysian races and less so in Philippine race (though clearly noticeable). In female this apical spot is indicated faintly by a slight brownish tinge.

#### 4. *Eurema blanda vallivolans* (Butler, 1882) (Figs. 33–36, 48)

Wing contour. ♂♀: Hindwing with termen evenly curved as in *simulatrix*. Forewing length 20–26 mm.

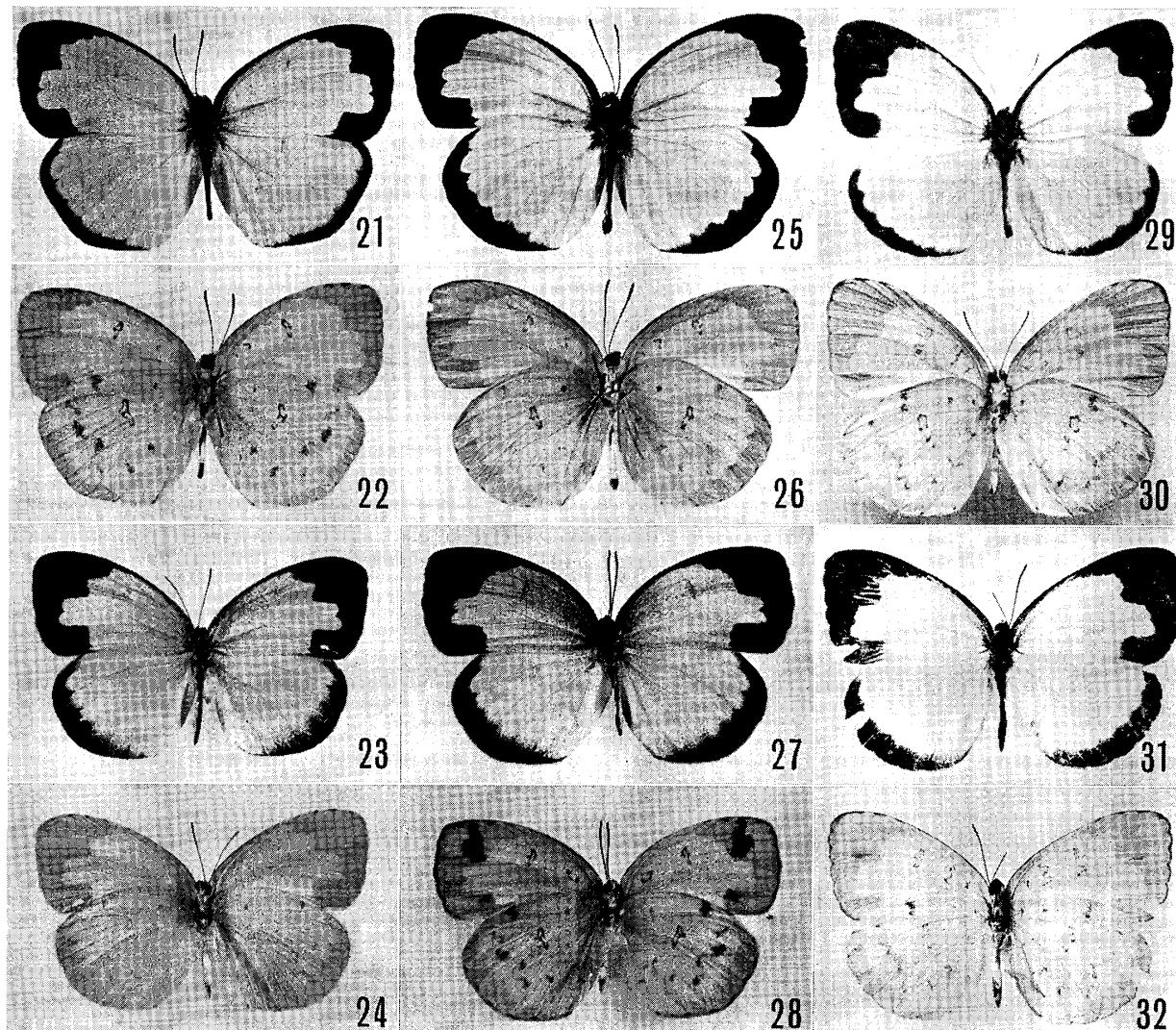
Uppercide. ♂: Ground colour paler lemon yellow than in *simulatrix*. Forewing with black border very variable, some markedly decreasing width of black area towards tornus, some with quadrate porjection at tornus, and less commonly black basal border continued along dorsum. Costa narrowly margined with black. Hindwing with very narrow black border almost extinct towards tornus.

♀: Ground colour almost concolorous with that of male. Black border very variable in both wings, normally markedly broader than in male and never decreasing its width at forewing tornus.

Underside. ♂♀: Lemon yellow with blackish brown spots less prominent than in *simulatrix*. Normally three cell spots on forewing, and a small spot at base of space 7 on hindwing.

Cilia of forewing black, and of hindwing yellow and black.

Male genitalia: Saccus similar to that of *simulatrix*, with length about  $0.6 \times$  height of ring. Valva with two curved finger-like appendages on costa+ampulla; distal process broad and flat, the tip of which is armed with several teeth; two appendages on harpe, i.e., the outer one being similar to the distal process, and the inner one finger-like. Uncus short and broad, barely tapering towards tip as in *hecate*, which clearly bifurcates and directs upward usually at the angle of  $120^\circ$  or sharper to stem.



Figs. 21-32. *Eurema* spp. (22, 24, 26, 28, 30, 32) underside; (21-22) *E. hecabe jalendra* (Fruhstorfer), ♂; (23-24) ditto, ♀; (25-26) *E. alitha hondai* ssp. nov., ♂; (27-28) ditto, ♀; (29-30) *E. simulatrix princesae* ssp. nov., ♂; (31-32) ditto, ♀.

Specimens examined: 1♂ Ransang, Palawan, 17. XI. 1969 (Y. Honda); 1♂, Panalingaan, Palawan, 15. XII. 1969. (Y. Honda); and many additional material.

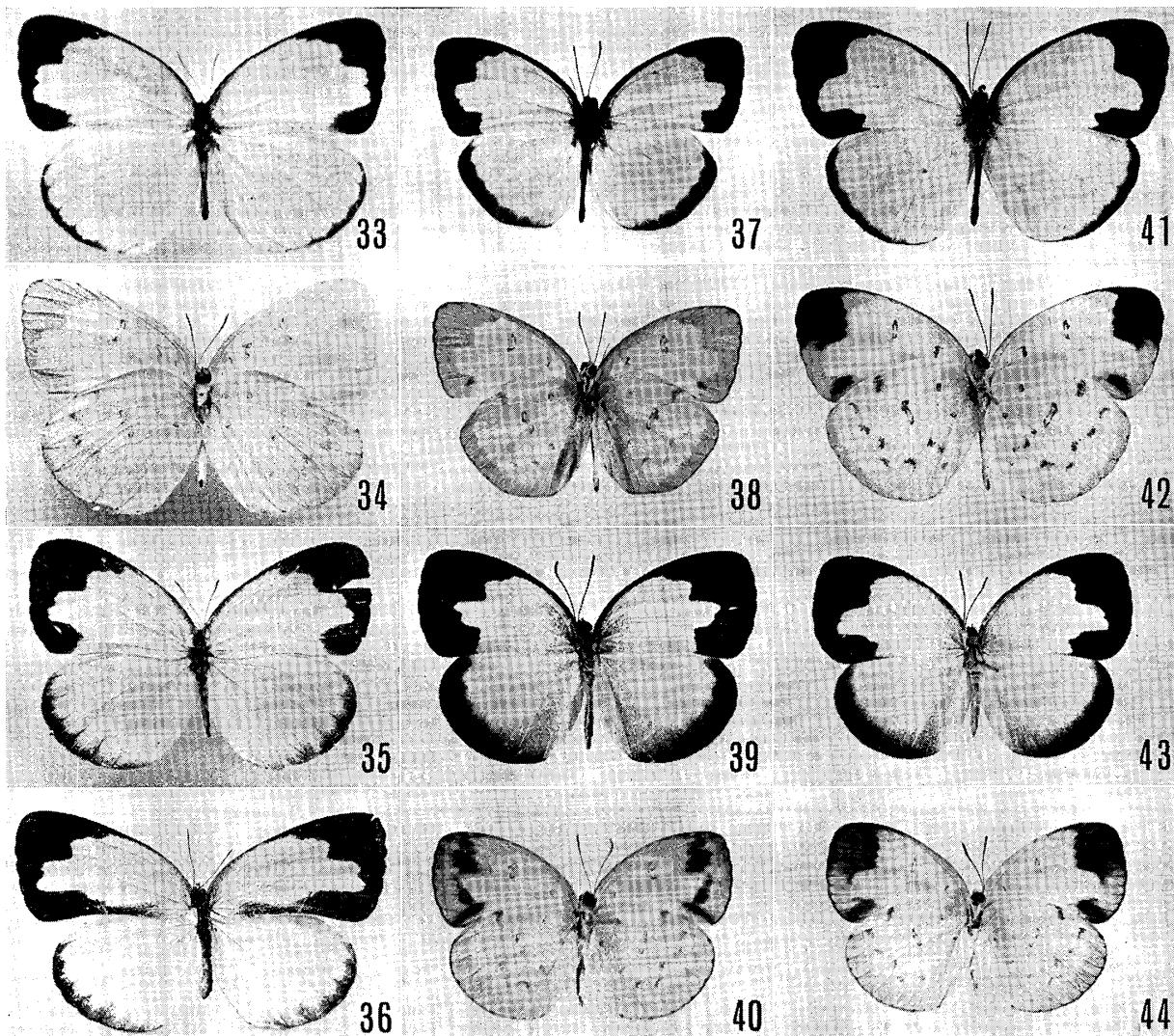
In this subspecies the individuals with a basal black border continued along dorsum of forewing are not rare in both sexes. The percentage of such individuals is low in Palawan, as compared with that of Mindanao, which is the type-locality of *vallivolans*.

##### 5. *Eurema andersoni konoyi* ssp. nov. (Figs. 37-40, 49)

Wing contour. ♂♀: Termen of hindwing very slightly angled in male. In female forewing termen convexed and hindwing termen without noticeable angle. Forewing length 20-21 mm.

Upperside. ♂: Ground colour lemon yellow, most similar to that of *simulatrix*. Forewing with usual black border, excavated more deeply in space 3 than in space 2. The angle at vein 4 nearly right angled and the one at vein 2 sharper than right angle, in other words black border in spaces 1a and 1b sloped towards tornus. Costa clearly black. Hindwing with broad black border, the inner margin of which is slightly waved.

♀: Both wings paler, and black-dusted towards base and hindwing tornus, and black border markedly broader; otherwise same features with male.



Figs. 33-44. *Eurema* spp., (34, 38, 40, 42, 44) underside: (33-34) *E. blanda vallivolans* (Butler), ♂; (35-36) ditto, ♀; (37-38) *E. andersoni konoyi* ssp. nov., ♂; (39-40) ditto, ♀; (41-42) *E. sari obucula* (Fruhstorfer), ♂; (43-44) ditto, ♀.

Underside. ♂♀: Almost same ground colour with upperside, with blackish brown spots which varies very little in intensity. Forewing with single cell spot, and without dark patch or stripe in apical area in male. Hindwing spots less prominent in outer area.

Cilia of forewing black, and of hindwing almost black.

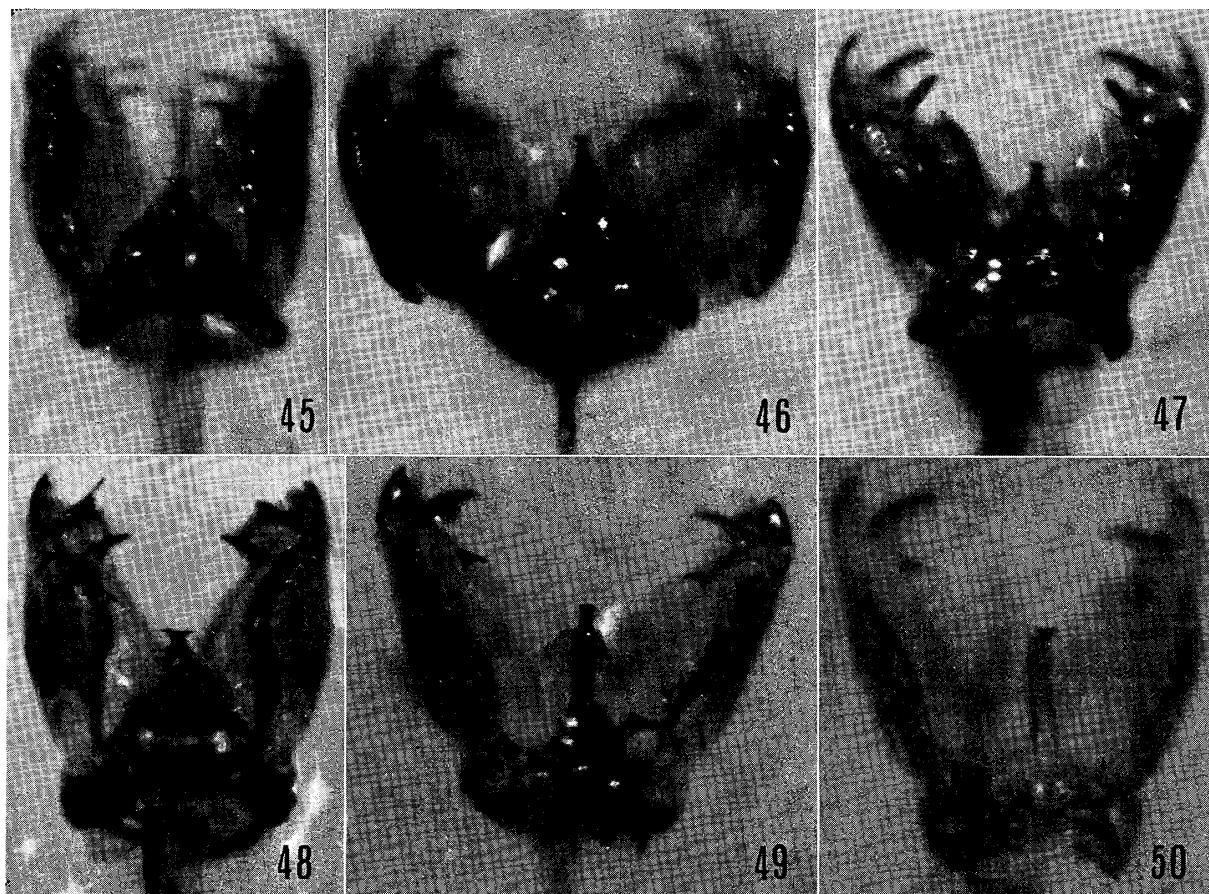
Male genitalia: Saccus similar to that of *simulatrix*, with length about  $0.6 \times$  height of ring. Valva with very slender finger-like appendage on costa+ampulla; blunt and curved distal process, two rather large, claw-like, appendages on harpe. Uncus long and slender, not tapering towards tip, which barely bifurcates and not distally concaved as in the preceding species. The tip directs upwards at the angle of  $120^\circ$  or sharper to stem. Phallus with suprazonal sheath strongly bowed.

Holotype ♂, Taot-Daram, Palawan, 30. IV. 1967 (Y. Honda); paratype ♀, Tagbros, Palawan, 14. VII. 1968 (Y. Honda). The type-series is preserved in the personal collection of Mr. Honda, Mino, Osaka, Prefecture.

Additional material: 4♂, 1♀, Taot-Daram, Palawan, 30. IV. 1967-30. VII. 1968 (Y. Honda); 3♀, Tagbros, Palawan, 12.-14. VII. 1968 (Y. Honda); and others.

In this new subspecies the male has the more produced forewing apex than that of other Indo-Malayan races. In both sexes the black border on the upperside hindwing is normally broader than in other races.

The subspecific name 'konoyi' comes from the Konoys, the tribe living in seclusion in highland of Palawan.



Figs. 45–50. *Eurema* spp., male genitalia, dorsal view; (45) *E. hecabe jalendra* (Fruhstorfer); (46) *E. alitha hondai* ssp. nov. (47) *E. simulatrix princesae* ssp. nov., (48) *E. blanda vallivolans* (Butler); (49) *E. andersoni konovi* ssp. nov., (50) *E. sari obucula* (Fruhstorfer).

#### 6. *Eurema sari obucula* (Fruhstorfer, 1910) (Figs. 41–44, 50)

Wing contour. ♂♀: Similar to that of *andersoni* but hindwing termen rounder and almost evenly curved in male, and both wings much rounder in female. Forewing length 20–23 mm.

Upperside. ♂: Ground colour yellow similar to that of *hecabe*. Forewing with usual black border, excavated more deeply in space 2 than in space 3; angle at vein 4 variable in shape; usually a small triangular projection in space 1b just above vein 1b and this feature is probably peculiar to the Palawan forms. Costa clearly black. Hindwing with narrow black border.

♀: Both wings paler, and dusted with black towards bases and hindwing tornus; otherwise same features with male.

Underside. ♂♀: Almost same ground colour with upperside, with blackish brown spots. Forewing with a single clear cell spot, with an entirely darkened reddish brown apical patch and with a rather diffuse, irregular, same coloured smaller patch at tornus.

Cilia of forewing black, and of hindwing almost black.

Male genitalia: Saccus longer and more slender than that of *simulatrix*, and distal end markedly spatulate, with length about  $0.7 \times$  height of ring. Valva with a single, very slender finger-like appendage on costa + ampulla; a minute spine at base of distal process; distal process broad, curved and sharply pointed; two rather large, claw-like appendage on harpe. Uncus long and slender, almost not tapering towards tip, which clearly bifurcates and directs upward at a sharper angle than  $120^\circ$  to stem. Phallus with a suprazonal sheath strongly bowed.

Specimens examined: 6♂, 1♀, Ransang, Palawan, 18. VII. 1968–27. XII. 1969 (Y. Honda); 2♂, 1♀, Taot-Daram, Plaawan, 28. VII.—2. VIII. 1968 (Y. Honda); other additional material.

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